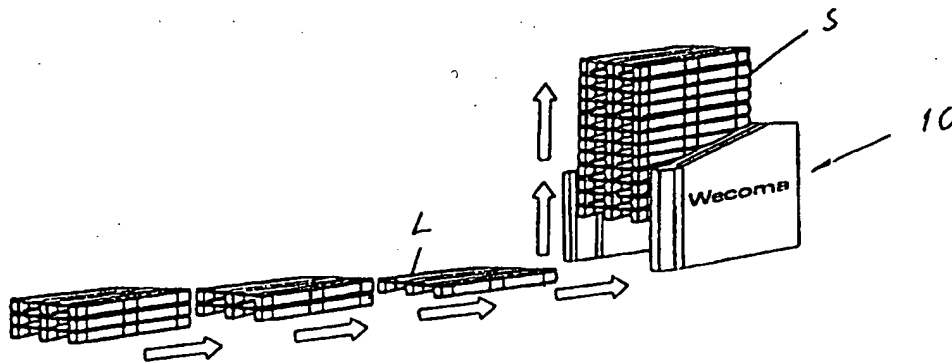




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : B65G 57/30, 59/06	A1	(11) International Publication Number: WO 97/39968 (43) International Publication Date: 30 October 1997 (30.10.97)
(21) International Application Number: PCT/SE97/00650 (22) International Filing Date: 17 April 1997 (17.04.97) (30) Priority Data: 9601526-8 22 April 1996 (22.04.96) SE (71)(72) Applicant and Inventor: WETTERSTÉN, Kenth [SE/SE]; Gamuddsvägen 14, S-144 00 Rönninge (SE). (74) Agents: ROSENQUIST, Per, Olof et al.; Bergenstråhle & Lindvall AB, P.O. Box 17704, S-118 93 Stockholm (SE).	(81) Designated States: CA, SE, US, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published With international search report. In English translation (filed in Swedish).	

(54) Title: PALLET STACKER



(57) Abstract

Pallet stacker for upstacking or downstacking of pallets, resting on each other in a stack. The pallet stacker comprises a lift mechanism, being disposed to lift a lower pallet one or more pallet heights, at wish, in engagement at two opposite side edges of said pallet for enabling upstacking of pallets during building-up of the stack from beneath. The lift mechanism is in one embodiment disposed to engage two opposite side edges of the second lowest pallet of the stack for lifting this pallet and the pallets above, at least one pallet height for enabling the removal of the lowest pallet of the stack and thus, downstacking from beneath.

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Pallet stacker

The present invention relates to a pallet stacker, i. e. a stacker for the upstacking or downstacking of pallets resting on each other in a stack, preferably standard size pallets, such as so called EUR-pallets or European pool pallets.

5 At the present time, pallets often will be handled by means of rather heavy and expensive fork trucks, e.g. in workshops, storages and the like. Alternatively, they will be handled all by hand, i.e. they will be lifted and moved by hand, which is a heavy, time consuming and risky occupation, as well, in view of the risks of personal injuries, damages of goods and products and of the pallets themselves. Often, due to the heavy
10 and troublesome handling, people neglect to stack the empty pallets in proper stacks at proper locations, the pallets being separately left at ill-placed locations, and thus occupying unnecessary space on the floor.

 The object of the present invention is to provide a pallet stacker, which eliminates the above shortcomings and which further makes it possible to keep control of the pallets
15 and to save truck time and to reduce pallet wear, the pallets easily being transportable to desired locations by means of simple and cheap pallet carriages, when needed.

 Another object of the present invention is to provide a pallet stacker, which comprises a minimum of movable parts, having a simple and robust construction, the driving of which being reliable and powerful, as well, so that the pallet stacker may be
20 used outdoors, as well, even in very cold weather.

 For these mentioned objects, the pallet stacker of the present invention is substantially characterized in that the pallet stacker comprises a lift mechanism, being disposed to lift a lower pallet in engagement with this lower pallet at two opposite side edges thereof, one or more pallet heights, at wish, for enabling the upstacking of pallets
25 when building-up the stack from beneath.

 Preferably, according to the invention, the lift mechanism is disposed to engage two opposite side edges of the second lowest pallet of the stack for lifting this pallet and the pallets above this pallet to at least one pallet height for enabling removal of the lowest pallet of the stack and thus, downstacking from beneath.

30 Hereinafter, the invention will be explained more in detail with reference to the annexed drawings.

 Fig. 1 is a view in perspective, showing an as an example chosen embodiment of a pallet stacker of the invention, used for the upstacking of pallets;

Fig. 2 is a view in perspective of another as an example chosen embodiment of a pallet stacker of the invention, which is used for the downstacking of pallets, the pallets being released one by one from a stack;

Fig. 3 is a side view of the pallet stacker of the present invention, partly in section;

5 Figs. 4, 5 and 6 shows details of the body of the pallet stacker of the present invention in a side elevational view, a rear elevational view, and a top elevational view, respectively;

Fig. 7 depicts that space on the pallet stacker of the present invention where the operating and lift mechanism is disposed, with some parts broken away, so that the mechanism may be seen;

Fig. 8 discloses the operating and lift mechanism of Fig. 7 alone, at a slightly enlarged scale;

Fig. 9 is a side view of a left lift beam;

Fig. 10 is an end view of this lift beam;

15 Fig. 11 is a sectional view at an enlarged scale along the line C-C in Fig. 9;

Fig. 12 depicts the encircled detail A of Fig. 9 at a larger scale;

Fig. 13 depicts the encircled detail B of Fig. 9 at a larger scale;

Figs. 14 and 15 are views corresponding to those of Fig. 9 and Fig. 10, but showing the right lift beam.

20 The pallet stacker of the invention, shown as an exemplary embodiment in Figs. 1 and 2, is intended for a European pool pallet with the dimensions 800 x 1200 mm and can normally be loaded with 20 pallets at most. Of course, other dimensions and other numbers could be imagined. In the example of Fig. 1 a pallet stacker is shown, generally referenced by 10, which is used for the upstacking of pallets L in a stack S, the purpose of Fig. 1 being to demonstrate that pallets L could be stacked one by one, two at a time or
25 three at a time, the pallets being transported to the pallet stacker resting on a so called pallet carriage, not shown, for building-up of the pallet stack from beneath.

As shown in Fig. 2 the pallet stacker 10 is used for the downstacking of pallets one by one from the stack S, the pallets being removed from the lower end of the stack by
30 means of a pallet carriage. Though not shown, it will also be possible to completely empty the pallet stacker 10 by removing the whole pallet stack S at a time.

The pallet stacker 10 shown, comprises a box body 11, which in a top elevational view has the shape of an U, and which is open in one end (the left end in Fig. 3) for

enabling the insertion and removal of the pallets. In a particular embodiment the box body has a lower opening in its rear side, opposite the open end, for enabling the transfer of the pallets through the stacker. The legs 11A, 11B and the cross beam or rear member 11C of the U-shape are shaped as boxes for receiving the operating and lift mechanism, Figs. 4, 5 and 6.

The lift mechanism of the pallet stacker comprises a hydraulic cylinder 12, which is supplied from a hydraulic unit 14, via a hydraulic hose 13. A comparison between Figs. 7 and 8 shows that the hydraulic cylinder 12 is disposed to raise or lower, respectively, a yoke 15, on which two sprockets 16, 17 are rotatably mounted side by side. The sprockets 16, 17 serve as guide rolls for respective chains 18, 19, the inner ends of which being attached to respective attachments 20 and 21, respectively, provided on a mobile carrier, generally referenced by 22, the outer ends of the chains being attached to respective pivotable lift beams 23 and 24, respectively. The lift beams 23, 24 are pivotable around axis 25, 26 and their upper ends are biased to be pivoted in a direction towards each other by means of a spring 27 extending therebetween, so that cam rolls 28 at the lower ends of the lift beams can run either on the outside of a respective cam 29 or on the inside of the cam 29 in question.

The apparatus is constructed in such a way, that the lower ends of the lift beams 23, 24 are pivoted in a direction towards each other against the action of the spring 27, when the hydraulic cylinder 12 displaces its piston rod upwardly to the position shown in Fig. 8. The lower ends of the lift beams will then be pivoted towards each other, till they will abut a respective bolt 30, Fig. 7 and Fig. 8, whereupon their pivot movement will be stopped, the lift beams being substantially vertical. Then tiltable lift tongues 31 provided on the lift beams will occupy a horizontal position, in which they can engage a pallet for lifting the same (together with any overlying pallets of the stack), when the mobile carrier 22 moves upwardly. This upwards movement of the carrier 22 occurs upon the continued prolongation of the hydraulic cylinder, so that the yoke 15 will move upwardly.

The question, whether the cam rolls 28 will run on one side of the cams 29, thereby keeping the lift tongues 31 in an operative, lift position during the total movement upwardly of the lift beam (for the insertion of one, two or three pallets from beneath in case of upstacking), or initially keep them retracted in a non lifting position during a longer or shorter distance of the movement of the lift beam for, so to speak "omitting"

the lowest pallet (during downstacking), will be determined by the angular position of the shaft 32, which is operable by a lever 32A and which is provided with a protruding finger 33, which may lift a tiltable abutment finger 34.

5 Of course, the pallet stacker of the invention is provided with necessary control means for the control of the operations of e.g. the hydraulic cylinder 12 and for the control of the separate operations, for example in such a way that the lifting or lowering movement will be stopped and can not be started if a pallet has got stuck or has been inserted askew in the stacker etc.

10 Various modifications and variations of details could be made within the scope of the invention described above and defined in the claims.

Claims

1. Pallet stacker for upstacking or downstacking of pallets resting on each other in a stack, **characterized in** that the pallet stacker comprises a lift mechanism, which is disposed to lift the lower pallet one or more pallet heights as desired in engagement with two opposite side edges of said pallet for enabling upstacking of pallets, when building-up the stack from beneath (Fig. 1).

2. Pallet stacker in accordance with claim 1, **characterized in** that the lift mechanism is disposed to engage two opposite side edges of the second lowest pallet of the stack for lifting said pallet and those pallets, which are situated above said pallet, at least one pallet height, for enabling the removal of the lowest pallet of the stack and thus downstacking from beneath (Fig. 2).

3. Pallet stacker according to claim 1 or claim 2, **characterized in** that the lift mechanism of the stacker comprises a hydraulic cylinder (12), which is supplied by a hydraulic unit (14) and is disposed to raise and lower, respectively, a yoke (15), on which two sprockets (16, 17) are rotatably mounted side by side, said sprockets (16, 17) serving as guide rolls for respective chains (18, 19), having their inner ends attached to respective attachments (20 and 21, respectively), provided on a mobile carrier (22), the other outer ends of said chains being attached to respective lift beams (23 and 24, respectively), which are disposed for engagement with a desired pallet at each occasion, that is at wish the lowest pallet (when upstacking) or the second lowest pallet (when downstacking).

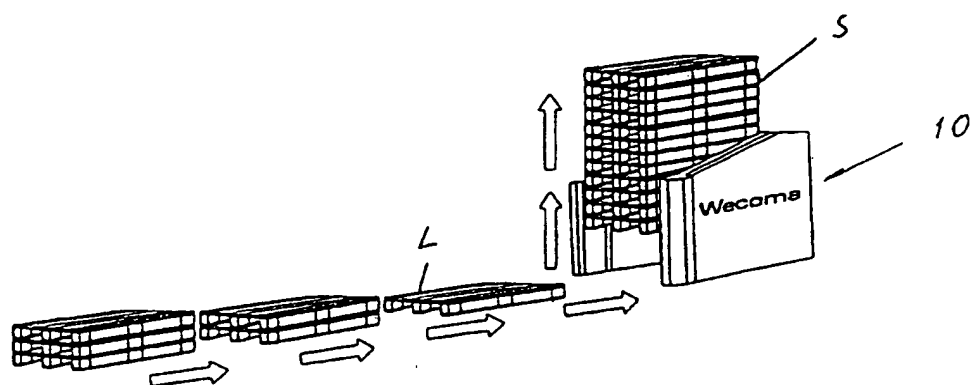


Fig 1

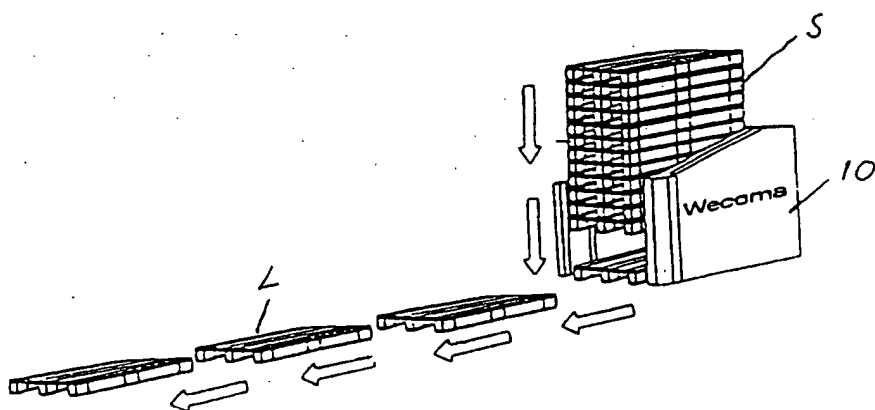


Fig 2

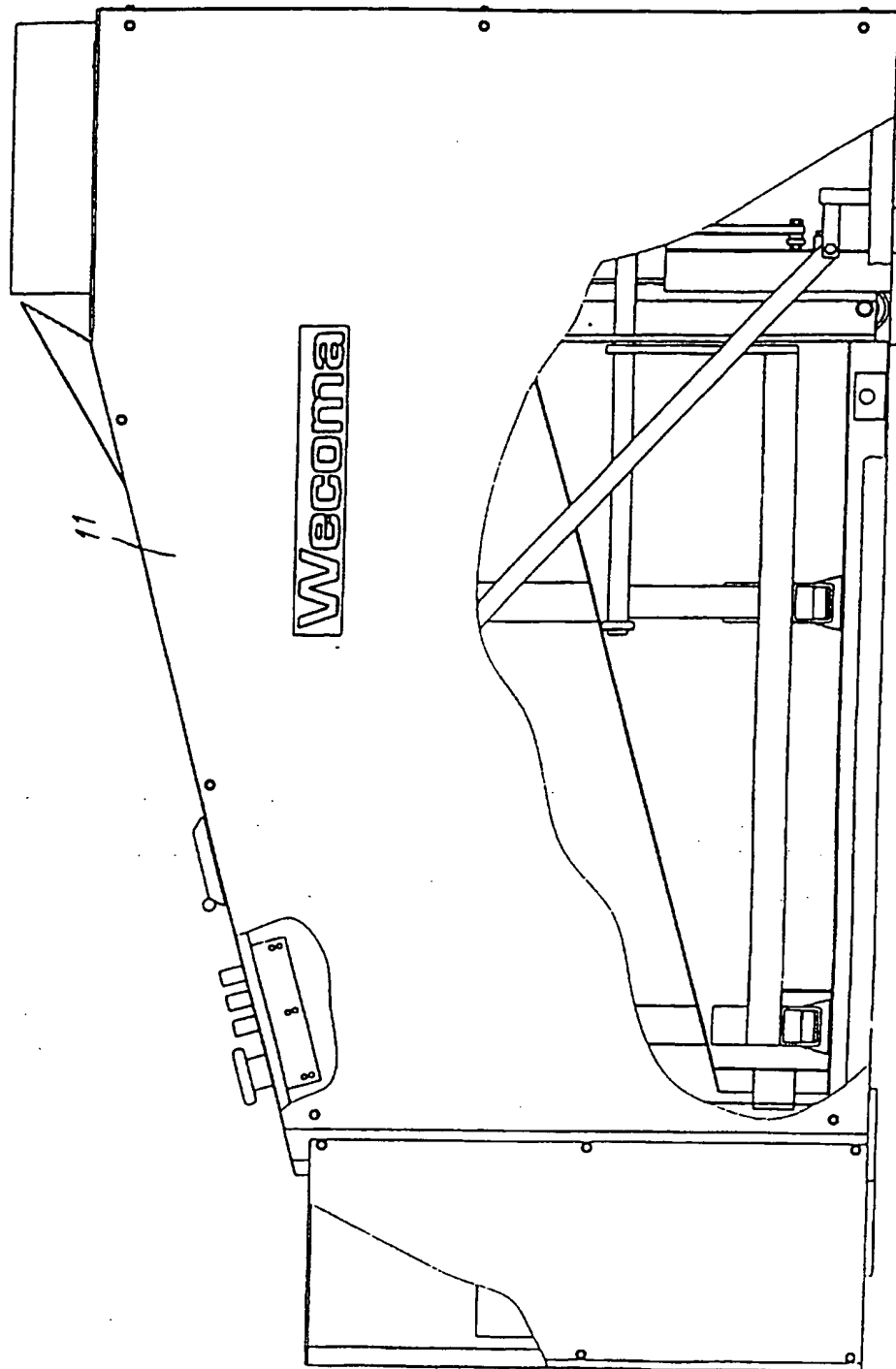


Fig 3

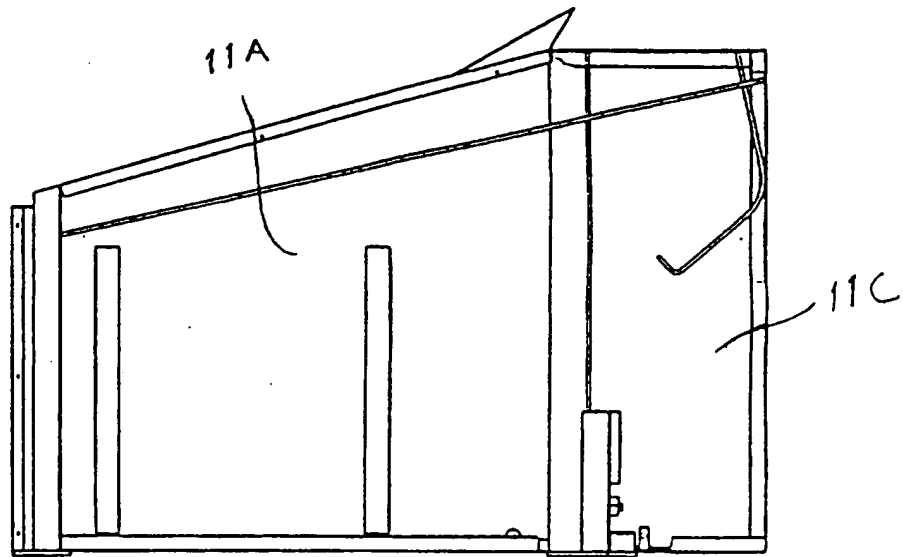


Fig 4

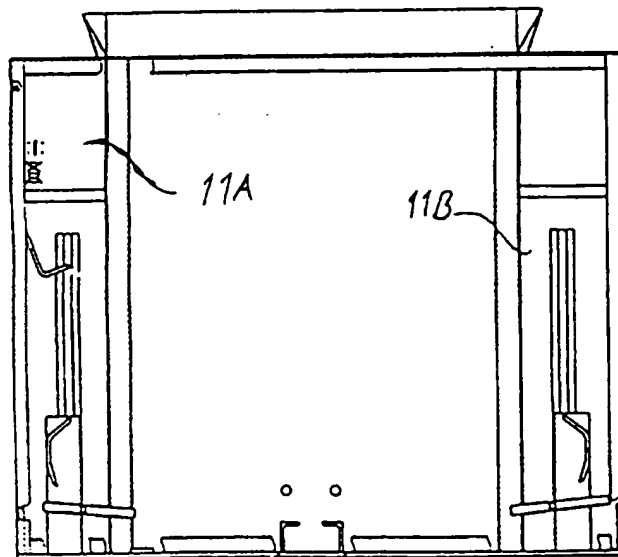


Fig 5

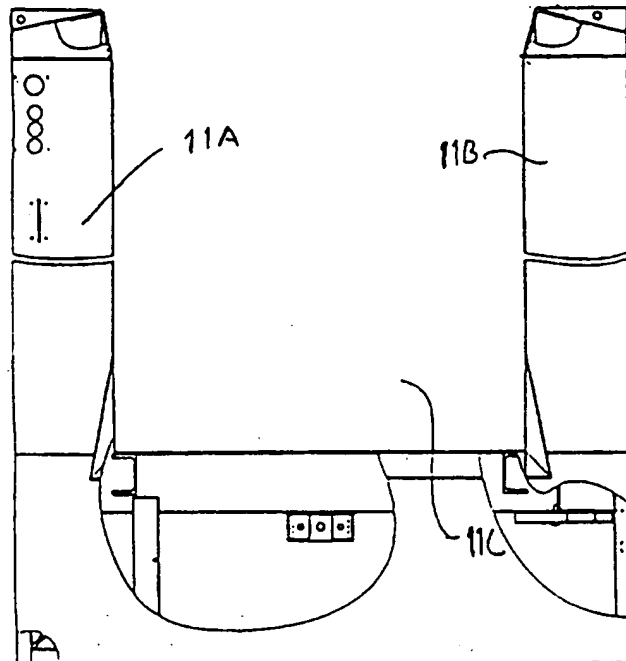


Fig 6

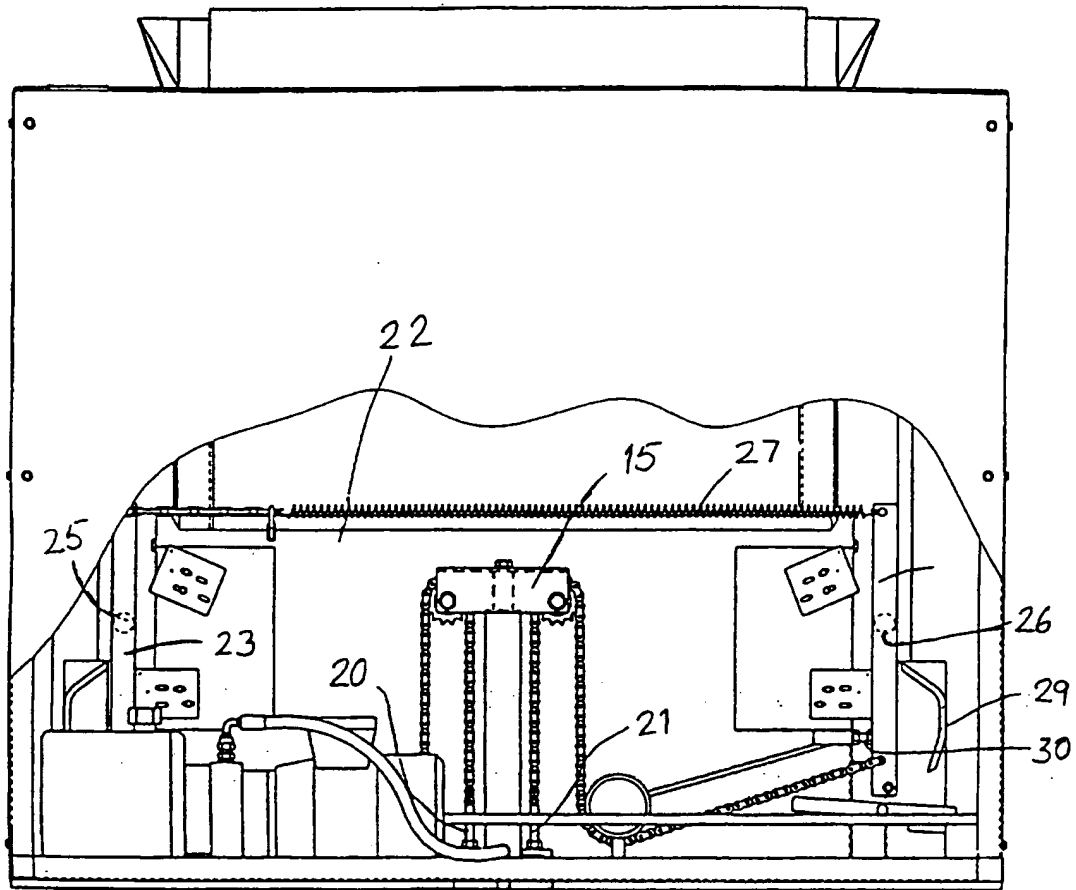
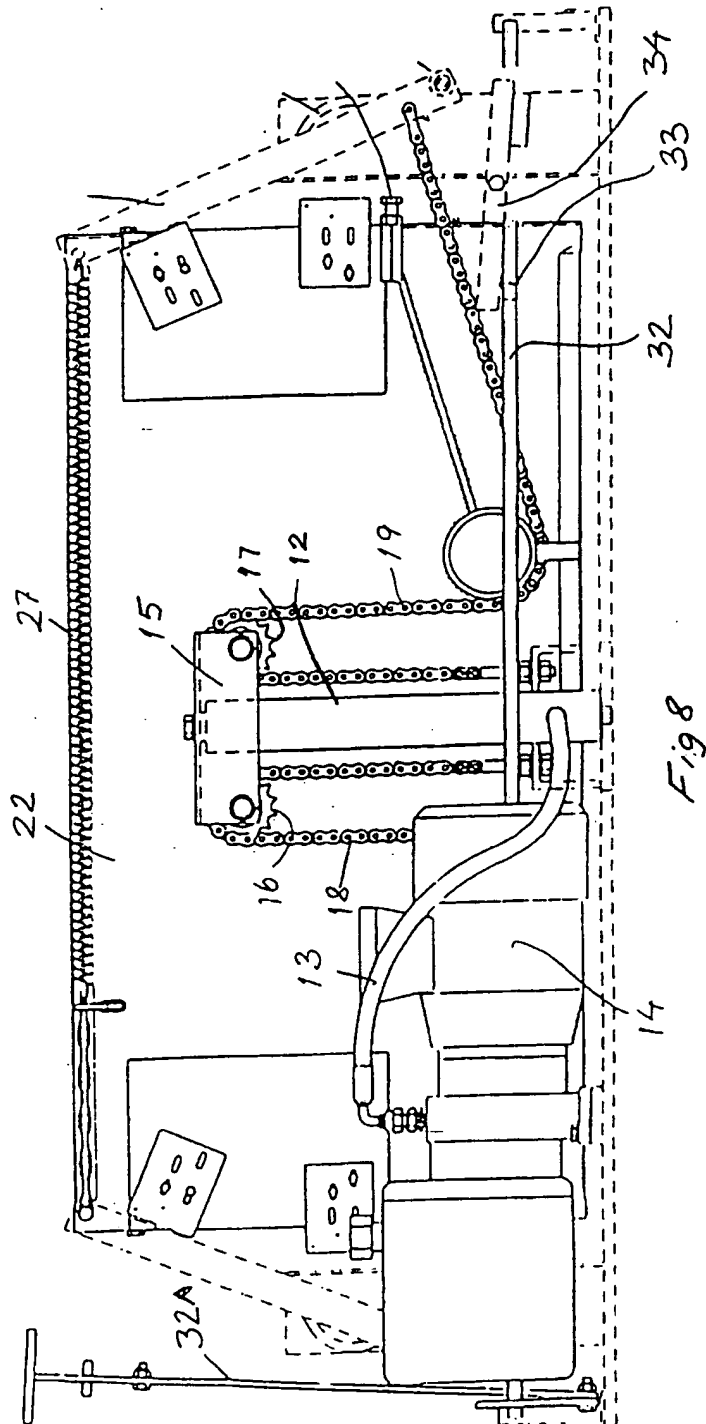
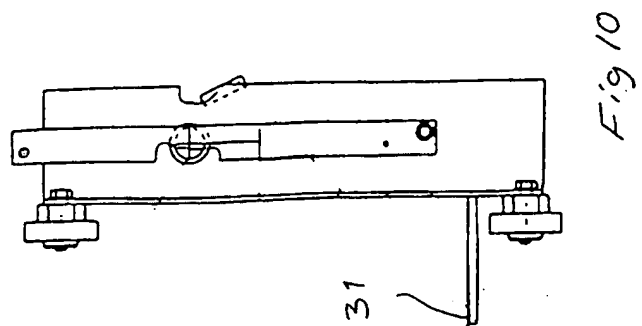
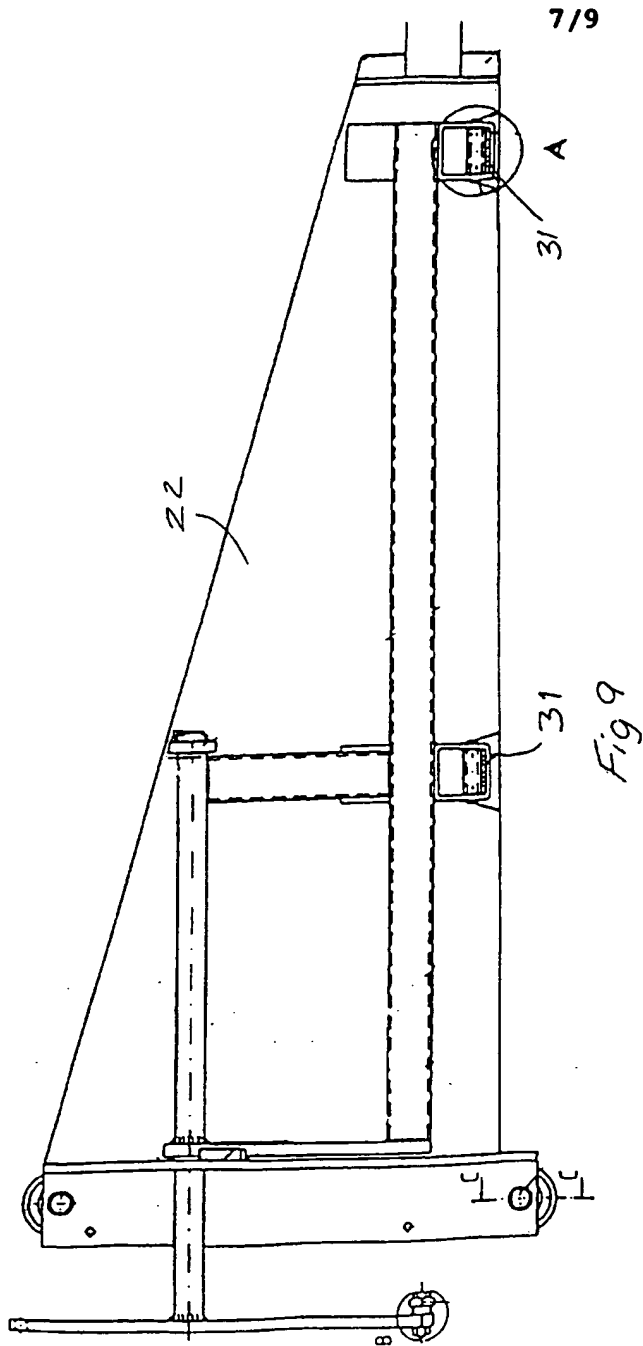


Fig 7





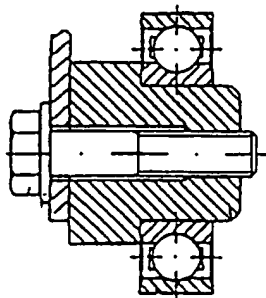


Fig 11

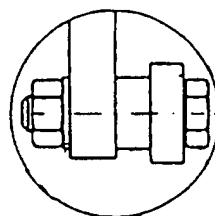


Fig 13

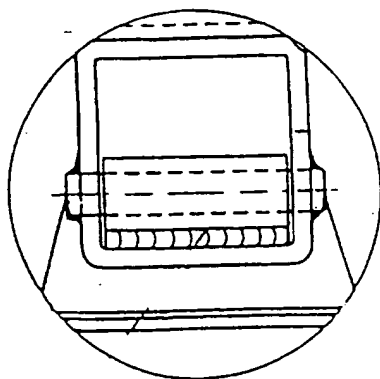


Fig 12

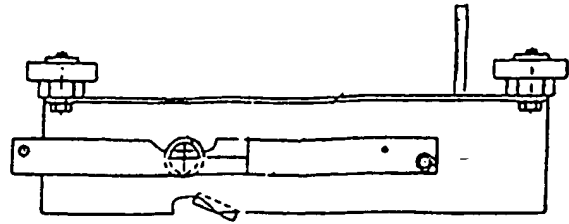


Fig 15

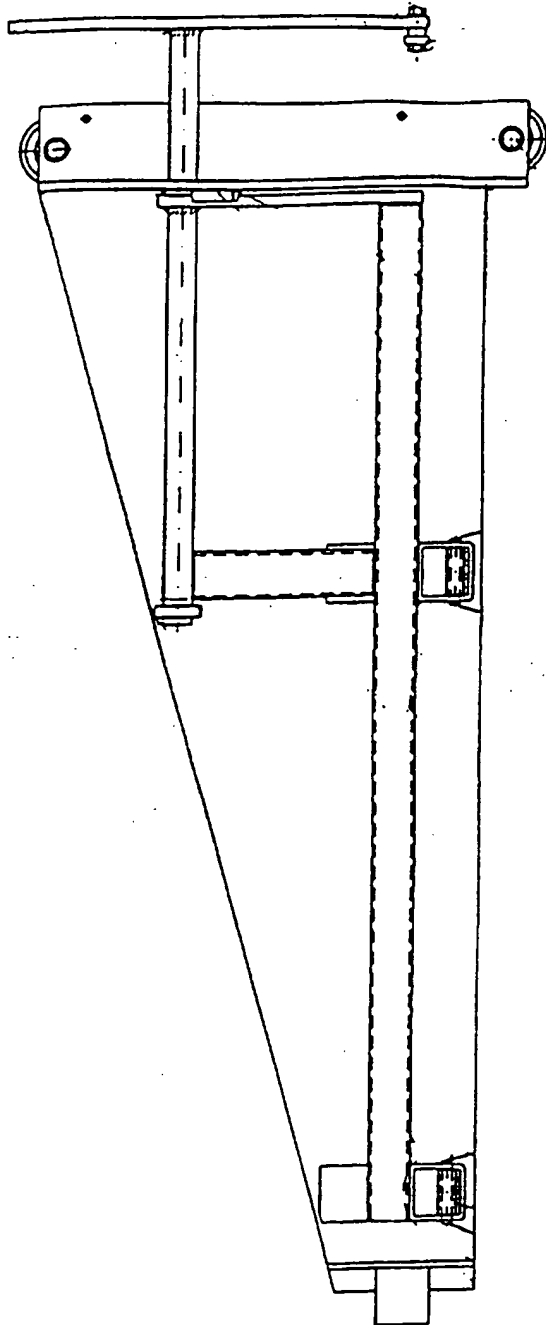


Fig 14

INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER		
IPC6: B65G 57/30, B65G 59/06 According to International Patent Classification (IPC) or to both national classification and IPC		
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Minimum documentation searched (classification system followed by classification symbols)		
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE 438307 B (AB BYGG- OCH TRANSPORTEKONOMI), 15 April 1985 (15.04.85)	1-2
Y	--	3
Y	SE 8704095-2 A (KENTH WETTERSTEN), 22 April 1989 (22.04.89)	3
A	--	1-3
A	FR 2721594 A1 (BLONDE CHRISTIAN), 29 December 1995 (29.12.95)	1-3
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Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0587929 A1 (BRENDKE, HANS-HENNING), 23 March 1994 (23.03.94) ----- -----	1-3

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

03/06/97

PCT/SE 97/00650

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE 438307 B	15/04/85	EP 0120823 A,B SE 8300725 A	03/10/84 11/08/84
SE 8704095-2 A	22/04/89	NONE	
FR 2721594 A1	29/12/95	NONE	
EP 0587929 A1	23/03/94	NONE	